

Roll No.

Total Pages : 3

751409

May, 2023

M.Sc. (Chemistry) IV Semester

PHYSICAL CHEMISTRY SPECIAL-IV (CH-423B)

Time : 3 Hours

Max. Marks : 75

Instructions :

- 1. It is compulsory to answer all the questions [1.5 marks each) of Part -A in short.*
- 2. Answer any four questions from Part -B in detail.*
- 3. Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) What do you mean by knee voltage and breakdown voltages? (1.5)
(b) Explain the concept of overpotential in brief. (1.5)
(c) Write Dropping Mercury Electrode (DME) applications in brief. (1.5)
(d) Define Phase Space with suitable example. (1.5)
(e) What do you mean by Force-Fields? Write various types of Force fields. (1.5)

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- (f) What do you mean by Radial Distribution Function? (1.5)
- (g) Define Mean Square Displacement. (1.5)
- (h) What is the Z-matrix? (1.5)
- (i) Write various battery characteristics specification. (1.5)
- (j) What do you mean by density of states (DOS)? (1.5)

PART-B

- 2. (a) Write short notes on :
 - (i) Hydrogen-Oxygen Fuel Cells,
 - (ii) Alkaline Fuel Cells,
 - (iii) Phosphoric Acid Fuel Cells.
 - (iv) Direct-Methanol Fuel Cells. (10)
- (b) Discuss various factors influencing solar cell efficiency. (5)

- 3. (a) Discuss I-V characteristics of p-n junction in details. (5)
- (b) Discuss recent advancement and future challenges in solar cells. (10)

- 4. Discuss Li-ion Batteries - Advantages, materials, recent advancements and future challenges. (15)

5. (a) Distinguish direct and indirect band gap semiconductors with suitable examples. (5)
- (b) Discuss principles of Coulometry technique, its types and applications in details. (10)
6. (a) Write Butler-Volmer equation and Tafel equations and discuss their significance and applications in electrochemistry. (10)
- (b) Discuss thermodynamics of light conversion. (5)
7. Discuss Simulated Annealing method - Advantages and applications. (15)
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